AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A computer-implemented method comprising ~~the steps of~~:

providing a graphical debugger that interfaces with:

a model view of a model being executed by an execution engine, where said model comprises a block that includes a plurality of block methods, where said block methods perform operations on behalf of said block when said block methods execute and said block is an owner of said block methods performed on behalf of said block, and

a block method execution list view of block methods called during execution of said model, where said model view and block method execution list view are simultaneously displayed using a display device;

sending debug information from said execution engine to said graphical debugger, where said debug information is related to said execution of said model;

~~said model comprising a block that includes a plurality of block methods, said graphical debugger having debug information related to the execution of said model, said debug information~~

indicating an order of execution of at least a subset of said plurality of block methods for said block ~~and a start time or a stop time of said plurality of block methods for said block~~ that are executed during ~~the~~ said execution of said model, said indicating performed using said debug information;

sending, using said graphical debugger, information to said execution engine, said information for controlling said execution of said model; [[and]]

outputting said debug information to a user[[,]] by simultaneously displaying said model view and said block method execution list and visually indicating a currently executing method in said block method execution list view; and

altering said model view to visually indicate the owner of said currently executing method. ~~said debug information allowing the user to determine proper or improper operation for at least a subset of said plurality of block methods that are executed in said block during the execution of said model.~~

2. (Original) The method of claim 1, comprising the further steps of:

wrapping data generated by the execution of said model in an object, said wrapping

encapsulating said execution-generated data in said object; and

exposing said data to said debugger via at least one interface to said object.

3. (Original) The method of claim 2, comprising the further step of:

altering said data via said interface.

4. (Original) The method of claim 2 wherein said execution-generated data is at least one of state information, block inputs, block outputs, solver data, profiling data and signal values for said model.

5. (Original) The method of claim 1, comprising the further steps of:

processing said model to create compiled model information; and

programmatically generating executable code from said compiled model information, said code including an interface to said debugger.

6. (Previously Presented) The method of claim 5, comprising the further step of:

executing said generated code wherein said debugger at least one of sends or receives information from said executing code during said execution.

7. (Previously Presented) The method of claim 6, comprising the further steps of:

saving an execution history for said executable code; and

outputting the execution history by at least one of saving it in a permanent memory location, displaying it for a user, or sending it to a printing device to be printed.

8. (Original) The method of claim 6 wherein said debugger is started after compilation and before the execution of said code.

9. (Previously Presented) The method of claim 1, comprising the further step of:

indicating graphically with said debugger a plurality of blocks that are part of an algebraic loop when the executing model is processing the algebraic loop.

10. (Canceled)

11. (Previously Presented) The method of claim 72 wherein said unique execution method invocation record comprises information about child records of a subset of said plurality of block methods executed inside said unique execution method invocation record.

12. (Previously Presented) The method of claim 11 wherein a link is provided from said unique execution method invocation record to said child record.

13. (Previously Presented) The method of claim 72 wherein said unique execution method invocation record comprises information regarding at least one parent record of one or more of the plurality of block methods in which said unique execution method invocation is executed.

14. (Previously Presented) The method of claim 13 wherein a link is provided from said unique execution method invocation record to said parent record.

15. (Previously Presented) The method of claim 72 wherein said unique execution method invocation record comprises data about a state of the unique execution method invocation.

16. (Previously Presented) The method of claim 15 wherein said state indicates the unique execution method invocation is at one of the states of entering, entered, exiting or exited.

17. (Previously Presented) The method of claim 1, comprising the further step of:

communicating with an external mode simulation using said debugger.

18. (Previously Presented) The method of claim 1, comprising the further step of:

saving a snapshot of data relating to model execution during execution of said model, said snapshot data sufficient to enable the subsequent restarting of the execution of said model using said snapshot data.

19. (Previously Presented) The method of claim 18 wherein said snapshot data is saved programmatically at one or more of a regular interval or based on a user-defined parameter.

20. (Previously Presented) The method of claim 19, comprising the further step of:

loading a saved snapshot into said debugger; and

executing a saved model based on said saved snapshot, said saved model executed from a point in time said snapshot was saved using information from said saved snapshot.

21. (Original) The method of claim 18, comprising the further step of:

displaying graphically to a user the saved snapshot data.

22. (Original) The method of claim 21, comprising the further step of:

displaying graphically to a user at least one additional set of snapshot data without restarting the execution of said model.

23. (Previously Presented) The method of claim 22 wherein said set of snapshot data is displayed in order of decreasing time.

24. (Original) The method of claim 18, comprising the further step of:

saving a difference between a set of current model execution data and a saved snapshot.

25. (Currently Amended) A medium for use in a modeling and execution environment on an electronic device, said medium holding executable instructions on the electronic device for performing an execution method, said method comprising the steps of:

providing a graphical debugger that interfaces with:

a model view of a model being executed by an execution engine, where said model comprises a block that includes a plurality of block methods, where said block methods perform operations on behalf of said block when said block methods execute and said block is an owner of said block methods performed on behalf of said block, and

a block method execution list view of block methods called during an execution of the model, where said model view and block method execution list view are simultaneously displayed using a display device;

sending debug information from said execution engine to said graphical debugger, where said debug information is related to said execution of said model;

~~said model comprising a block that includes a plurality of block methods, said graphical~~

~~debugger having debug information related to the execution of said model, said debug information~~

indicating ~~at least one of the~~ an order of [[the]] execution of at least a subset of said [[a]] plurality of block methods ~~in said model and a start time or a stop time of at least one block method~~ executed during the execution of said model, said indicating performed using said debug information;

sending, using said graphical debugger, information to said execution engine, said information for controlling said execution of said model; [[and]]

outputting said debug information to a user[[,]] by simultaneously displaying said model view and the block method execution list and visually indicating a currently executing method in said block execution list view; and

altering said model view to visually indicate the owner of said currently executing method. ~~said debug information allowing the user to determine proper or improper operation for at least a subset of said plurality of block methods for the block that are executed during the execution of said model.~~

26. (Original) The medium of claim 25, wherein said method comprises the further steps of:

wrapping data generated by the execution of said model in an object, said wrapping encapsulating said execution-generated data in said object; and

exposing said data to said debugger via at least one interface to said object.

27. (Previously Presented) The method of claim 26, comprising the further step of:

altering said data via said at least one interface.

28. (Previously Presented) The medium of claim 26 wherein said execution-generated data is at least one of state information, block inputs, block outputs, or signal values for said model.

29. (Previously Presented) The medium of claim 25, wherein said method comprises the further steps of:

processing said model to create compiled model information; and

programmatically generating executable code from said compiled model information, said generated code including an interface to said debugger.

30. (Original) The medium of claim 29, wherein said method comprises the further step of:

executing said generated code wherein said debugger sends and receives information from said executing code during said execution.

31. (Previously Presented) The medium of claim 30 wherein said method comprises the further steps of:

saving an execution history for said executed code; and

outputting the execution history by at least one of saving it in a permanent memory location, displaying it for a user, or sending it to a printing device to be printed.

32. (Previously Presented) The medium of claim 30, comprising the further steps of:

initiating said executing; and

starting said debugger subsequent to said initiating.

33. (Original) The medium of claim 25, wherein said method comprises the further step of:

indicating graphically with said debugger a plurality of blocks that are part of an algebraic loop when execution of the model is processing the algebraic loop.

34. (Previously Presented) The medium of claim 25, wherein said method comprises the further step of:

saving a record of a unique execution method invocation, said unique execution method invocation comprising information related to the execution of a block method that belongs to at least one of a block, a system, or a model instance in an execution list of called block methods.

35. (Previously Presented) The medium of claim 34 wherein said unique execution method invocation record comprises information about child records of block methods executed inside the unique execution method invocation record.

36. (Previously Presented) The medium of claim 35 wherein a link is provided from said unique execution method invocation record to said child record.

37. (Previously Presented) The medium of claim 34 wherein said unique execution method invocation record includes information regarding at least one parent record of block methods in which the unique execution method invocation is executed.

38. (Previously Presented) The medium of claim 37 wherein a link is provided from said unique execution method invocation record to said parent record.

39. (Previously Presented) The medium of claim 34 wherein said unique execution method invocation record comprises data about the state of an invocation of the block method.

40. (Previously Presented) The medium of claim 39 wherein said state indicates the block method invocation is at one of the states of entering, entered, exiting or exited.

41. (Original) The medium of claim 25, wherein said method comprises the further step of: communicating with an external mode simulation with said debugger.

42. (Previously Presented) The medium of claim 25, wherein said method comprises the further step of:

saving a snapshot of data relating to model execution during execution of said model, said snapshot data sufficient to enable subsequent restarting of the execution of said model using said snapshot data at a saved point in time.

43. (Previously Presented) The medium of claim 42 wherein said snapshot data is saved programmatically at one or more of a regular or user-defined interval.

44. (Previously Presented) The medium of claim 42, wherein said method comprises the further step of:

loading a saved snapshot into said debugger; and

executing a saved model from the point in time said snapshot was saved.

45. (Original) The medium of claim 42 wherein said method comprises the further step of:

displaying graphically to a user the saved snapshot data.

46. (Original) The medium of claim 45 wherein said method comprises the further step of:

displaying graphically to a user at least one additional set of snapshot data without restarting the execution of said model.

47. (Previously Presented) The medium of claim 46 wherein said set of snapshot data is displayed in order of decreasing time.

48. (Currently Amended) A computer-implemented method, comprising:

providing a computer-based modeling application that executes a model comprising blocks, each block having a sample time and including a plurality of block methods, where said block methods perform operations on behalf of the block when said block methods execute;

determining whether the modeling application should execute the model in a single task simulation loop or a multi-task simulation loop, wherein said model is executed in said single task simulation loop if said model is a single rate system wherein said sample time for each of said blocks is the same and said model is executed in said multi-task simulation loop if said model is a multi-rate system wherein at least one sample time for at least one of said blocks is different from at least one sample time for another one of said blocks;

executing said model using said single task simulation loop or said multi-task simulation loop;

identifying a first block method operating in a first environment of ~~a~~ said computer-based modeling application ~~that executes a model~~, where the first environment is one of a text-based environment, a time-based block diagram, a state based block diagram, or a data-flow diagram, where said identifying is performed, using debug information related to said execution of said model, by a graphical debugger that is interfaced with the first environment and the second environment while the computer-based model operates on behalf of a user;

identifying, using said graphical debugger, a second block method operating in a second environment, where the second environment differs from the first environment;

debugging the first block method and the second block method with ~~a~~ said debugger ~~that is interfaced with the first environment and the second environment while the computer-based model operates on behalf of a user~~; and

generating, using said graphical debugger, output information for the user or for a

destination, the output information identifying when the first block method or the second block method are operating, identifying an operation performed by the first block method or the second block method at a determined location in the first block method or the second block method, or identifying an error related to the first execution method or the second block method during execution of the computer-based model.

49. (Previously Presented) The method of claim 48, further comprising:

displaying the output information to a user or sending the output information to the destination.

50. (Previously Presented) The method of claim 48, further comprising:

providing a destination interface, the destination interface allowing extensible debugging of the first block method and another block method or debugging of the second block method and the another block method.

51. (Previously Presented) The method of claim 48, further comprising:

displaying a hierarchy containing information about the first block method or the second block method, the hierarchy allowing a user to identify relationships between the first block method and the second block method, the first block method and another block method, or the second block method and the another block method.

52. (Previously Presented) The method of claim 48, wherein the debugging further comprises:

debugging the first block method or the second block method with respect to a block diagram.

53. (Previously Presented) The method of claim 48, further comprising:

identifying the first block method or the second block method using a visual indicator to identify when the first block method or the second block method is executing.

54. (Currently Amended) A computer-implemented method, comprising:

receiving information about a first block method and a second block method on behalf of a graphical model comprising blocks, each block in the graphical model including a plurality of

block methods, said block methods performing operations on behalf of a corresponding bock when said block methods execute, and said corresponding block being an owner of said block methods performed on behalf of said corresponding block, where at least one of the blocks includes the first block method and at least one other block method or the second block method and the at least one other block method~~, where the first block method or the second block method are related to one or more of the blocks~~;

identifying, using an execution engine, at least a portion of the first block method or the second block method when the first block method or the second block method are running, respectively;

obtaining information about the running of the first block method or the second block method using the identifying; [[and]]

providing debugging information to a user via a display or providing debugging information to a destination device, the debugging information provided by a debugger that interfaces with the graphical model and a list of block methods called during simulation of the graphical model, where said graphical model and said list of block methods are simultaneously displayed using a display device, the debugging information identifying the first block method or the second block method and information about the first block method or the second block method, respectively;

sending, using said debugger, information to said execution engine, said information for controlling said simulation of said graphical model; and

altering a model view of said graphical model to visually indicate the owner of either the first block method or the second block method.

55. (Currently Amended) A computer-implemented method, comprising:

identifying a first root method comprising one or more child methods, the first root method related to a graphical modeling application;

identifying a second root method related to the graphical modeling application, wherein the first root method and the second root method are related to one or more blocks in a model in the graphical modeling application, each block in said model including a plurality of block methods, said block methods performing operations on behalf of a corresponding bock when said block methods execute, and said corresponding block being an owner of said block methods performed on behalf of said corresponding block;

running the first root method and the second root method in a graphical debugger to obtain information about the operation of the first root method or the second root method, the graphical debugger interfaced with a method list of block methods called during simulation of a model in the graphical modeling application and a model view of [[a]] said model in the graphical modeling application, where said model view and method list are simultaneously displayed using a display device and said simulation is carried out by an execution engine;

sending, using said graphical debugger, information to said execution engine, said information for controlling said execution of said model; and

displaying a debugging result to a destination, the debugging result comprising visual identifiers related to the owner of said first root method, the one or more child methods or the second root method, and the operation of the first root method, the one or more child methods or the second root method, error information about the first root method, the one or more child methods or the second root method, an execution result for the first root method, the one or more child methods or the second root method, or status information related to the first root method, the one or more child methods or the second root method.

56. (Currently Amended) A computer-implemented method for implementing a user interface for debugging a graphical model, the method comprising:

providing a computer-based modeling application that executes said graphical model, said graphical model comprising blocks, each block having a sample time and including a plurality of block methods, where said block methods perform operations on behalf of the block when said block methods execute;

determining whether the modeling application should execute said graphical model in a single task simulation loop or a multi-task simulation loop, wherein said graphical model is executed in said single task simulation loop if said graphical model is a single rate system wherein said sample time for each of said blocks is the same and said graphical model is executed in said multi-task simulation loop if said model is a multi-rate system wherein at least one sample time for at least one of said blocks is different from at least one sample time for another one of said blocks;

executing said graphical model using said single task simulation loop or said multi-task simulation loop;

displaying a hierarchy comprising information about a first root method, one or more

child methods related to the first root method, or a second root method, the hierarchy displaying information about the first root method, the one or more child methods, or the second root method in an arrangement representing a relationship among the first root method, the one or more child methods, or the second root method; and

displaying an indicator on the hierarchy proximate to the first root method, the one or more child methods, or the second root method, the indicator denoting a status of the first root method, the one or more child methods, or the second root method, where the status indicates whether the first root method, the one or more child methods, or the second root method are operating according to determined parameters, the determination of whether the first root method, the one or more child methods, or the second root method are operating according to determined parameters made by a debugger that interfaces with a method list of block methods called during simulation of the graphical model and a model view of the graphical model.

57. (Previously Presented) The method of claim 56, wherein the displaying an indicator further comprises:

displaying a first symbol when the status is related to the first root method; and

displaying a second symbol when the status is related to the one or more child methods or the second root method.

58. (Previously Presented) The method of claim 56, wherein the displaying an indicator further comprises:

displaying a first color to represent a first status related to the first root method; and

displaying a second color to represent a second status related to one of the one or more child methods or the second root method.

59. (Previously Presented) The method of claim 56, further comprising:

displaying the hierarchy in a first region related to one or more display devices; and

displaying a graphical diagram related to the first root method or the second root method in a second region related to the one or more display devices, the graphical diagram synchronized with information displayed in the first region.

60. (Previously Presented) The method of claim 56, further comprising:

displaying a first indicator in a first region proximate to the first root method, the one or more child methods, or the second root method; and

displaying a second indicator in a second region, where the first indicator and the second indicator identify a relationship between information displayed in the first region and information displayed in the second region.

61. (Currently Amended) A method for debugging operation of a graphical icon, the method comprising:

providing a computer-based modeling application that executes said graphical icon, said graphical icon comprising blocks, each block having a sample time and including a plurality of block methods, where said block methods perform operations on behalf of the block when said block methods execute;

determining whether the modeling application should execute the graphical icon in a single task simulation loop or a multi-task simulation loop, wherein said graphical icon is executed in said single task simulation loop if said graphical icon represents a single rate system wherein said sample time for each of said blocks is the same and said graphical icon is executed in said multi-task simulation loop if said graphical icon represents a multi-rate system wherein at least one sample time for at least one of said blocks is different from at least one sample time for another one of said blocks;

executing said graphical icon using said single task simulation loop or said multi-task simulation loop;

identifying a plurality of block methods for the graphical icon using a plurality of regions related to the graphical icon;

displaying information about a first one of the plurality of block methods in a first one of the plurality of regions or information about a second one of the plurality of block methods in a second one of the plurality of regions; and

associating the information in the first one of the plurality of regions or information in the second one of the plurality of regions with a graphical debugger to provide a user with debugging results for the first one of the plurality of block methods or the second one of the plurality of block methods, the debugging results allowing the user to identify desirable operations performed on behalf of the graphical icon or undesirable operations performed on behalf of the graphical icon, the graphical debugger interfacing with a view of the graphical icon

and an execution methods list of block methods performed on behalf of the graphical icon.

62. (Previously Presented) The method of claim 61, further comprising:

displaying information about a first one of the plurality of block methods in a first region of a display area; and

displaying the debugging results in a second region of the display area, the displayed debugging results linked to at least a portion of the displayed information in the first region.

63. (Previously Presented) The method of claim 61, further comprising:

displaying a hierarchy in a region of the display device; and

displaying the debugging results for the first one of the plurality of block methods or the second one of the plurality of block methods using the hierarchy.

64. (Previously Presented) The method of claim 61, wherein the first one of the plurality of block methods is a root method comprising one or more child methods,
and wherein the method further comprises:

displaying the graphical icon and graphical icon debugging information in a first display area, the graphical icon debugging information mapped to the graphical icon; and

displaying information about the root method and the one or more child methods in a hierarchy, where information in the hierarchy is linked to the graphical icon debugging information.

65. (Previously Presented) The method of claim 64, further comprising:

identifying the root method or one or more of the one or more child methods using a first indicator; and

identifying the graphical icon debugging information using a second indicator.

66. (Previously Presented) The method of claim 65, wherein the first indicator or the second indicator are a color, a pointer, a symbol, a font, or a border.

67. (Previously Presented) The method of claim 64, wherein the first display area comprises a window that displays information about the graphical icon or the graphical icon debugging

information.

68. (Previously Presented) The method of claim 67, wherein the window comprises a visual indicator to connect the window to the graphical icon or to the graphical icon debugging information.

69. (Previously Presented) The method of claim 64, further comprising:
displaying an execution list in the hierarchy, the execution list related to the root method or the one or more child methods.

70. (Previously Presented) The method of claim 1, wherein the model comprises a plurality of blocks having block methods, and wherein the debug information indicates an order of execution of said block methods of said plurality of blocks, during execution of the model.

71. (Previously Presented) The medium of claim 25, wherein the model comprises a plurality of blocks having block methods, and wherein the debug information indicates an order of execution of said block methods of said plurality of blocks, during execution of the model.

72. (Previously Presented) The method of claim 1, comprising the further step of:
saving a record of a unique execution method invocation comprising information related to execution of one of said plurality of block methods that belongs to said block or to a second block in the model, a system, or a model instance in an execution list of called block methods.